**BGREEN - Building a Regional Energy and Educational Network:**

**Network of 4 Major Universities**

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<tr>
<th>UTEP</th>
<th>TAMUK</th>
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<tbody>
<tr>
<td>Heidi A. Taboada (PI)</td>
<td>Shad D. Nelson (PI)</td>
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<td><a href="mailto:hataboada@utep.edu">hataboada@utep.edu</a></td>
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<tr>
<td>Jose F. Espiritu</td>
<td>Greta Schuster</td>
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<td>William Hargrove</td>
<td>Roger D. Hanagriff</td>
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<td>Salvador Hernandez</td>
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<td>Juan Noveron</td>
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<td>Shane Walker</td>
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<tr>
<th>Texas State</th>
<th>NMSU</th>
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<tr>
<td>T. Jin (PI)</td>
<td>Delia Valles (PI)</td>
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<td><a href="mailto:tj17@txstate.edu">tj17@txstate.edu</a></td>
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<tr>
<td>R. Richardson (co-PI)</td>
<td>Hansuk Sohn</td>
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<tr>
<td>J. A. Jimenez (co-PI)</td>
<td>Ram Acharya</td>
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<td>Nirmala Khandan</td>
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**Opportunities with USDA Event**

Texas State University
May 7, 2015
Presentation Highlights

1) Students Involvement in GREEN
2) Students Publications in Journals
3) Student Conference Participations
4) Students Job and Career Placement
5) PI and Co-PI Research Highlights
BGREEN Goals

1) Create a collaborative network of researchers, educators, USDA agencies, and non-profit organizations

2) Increase educational, training and post-graduation opportunities for Hispanic students in the Sustainable Energy area
BGREEN Summary at Texas State (9/2011 to 5/2015)

- Up to 41 participant students (six graduate students).
- 60% Hispanic students and 70% with all minorities included.
- More than 50% female students.
- Total of seven majors and two colleges. Agriculture, industrial, manufacturing, electrical, technology, computer science, chemistry and geology.
- With seven faculty supervisors spanning five departments: Department of Agriculture, Ingram School of Engineering, Chemistry Department, Department of Technology, Computer Science Department.
Industrial engineering student places 1st at HENAAC Conference

By Kristina Kenney
University News Service
October 19, 2011

Texas State University-San Marcos School of Engineering student Saul Villarreal took top honors at the Hispanic Engineer National Achievement Awards Corporation (HENAAC) Conference on Oct. 8, placing first for his research on "Modeling, Analysis and Integration of Distributed Generation Systems in a Semiconductor Wafer Fab."

Villarreal, an industrial engineering senior, competed against such universities and laboratories as the University of Notre Dame, NASA Jet Propulsion Laboratory, Clemson University and Florida A&M University. Villarreal worked with assistant professors Jesus Jimenez and Tongdan Jin from the Ingram School of Engineering on the project.

The annual HENAAC conference was initiated in 1989 as a means of identifying, honoring, and documenting the contributions of outstanding Hispanic American scientists, engineers, technology and math professionals, and during the past 22 years, the conference has evolved to provide additional activities and opportunities for students and professionals. The conference’s main goal is to highlight and showcase outstanding role models in order to inspire young people to pursue careers in technology and to motivate professionals to continue to connect with the Hispanic community.

For more information, contact Susan Romanella at (512) 246-7484 or by email at sr23@txstate.edu.


Conference and Poster Presentations by BGREEN Students

- **USDA Meeting at Texas State University**
  In 2013 and 2015. Total of 19 student posters

- **International Green Computing Conference,**
  In year 2013 (San Diego) and 2014 (Dallas). Total of 2 students

- **INFORMS Conference**
  in 2012 (Phoenix), 2013 (Minneapolis), 2014 (San Francisco).
  Total of 5 students

- **Industrial and Systems Engineering Research Conference**
  in 2013 (Puerto Rico), 2014 (Montreal), 2015 (Nashville).
  Total of 9 students.

- **WISE Conference at Texas State U (Women in Science and Engineering)**
  in 2014, total of 2 students

- **Southwest Energy Science and Engineering Symposium**
  in 2012 (El Paso), total of 1 student
1) Saul Villarreal graduated with a BS in industrial engineering; Saul joined Energy Solutions as a simulation analyst and then he joined the City of Seattle (WA) as a power analyst.

2) Victor Santana-Viera graduated with a BS in industrial engineering; he is currently in the semiconductor manufacturing industry at SAMSUNG.

3) Ivan Zecena graduated with a MS in computer science, working in GM for electric vehicle, high performance and green computing development.

4) Fei Sun, graduated with MS in Technology, and apply for Ph.D. in MSEC at Texas State U, Fall 2015.

5) Tiffanie Martin is expected to graduate in December 2015 with a BS in industrial engineering; she will join INFINEON (Germany) as intern this summer.
Renewable Energy Integration (Dr. Jin)

**Smart Power Grid:**
- Wind turbines
- Solar Photovoltaics
- Electric Vehicles
- Distributed generation
- Dynamic pricing

**Benefits:**
- Zero Carbon Emissions
- Mitigating Climate Change
- Sustainability

**Challenges:**
- Power Intermittent
- Equipment cost
- Paradigm Shift
• Develop analytical and simulation models to:
  • Design and implement “zero” waste in manufacturing systems.
  • Identify and reduce levels of carbon emissions.
  • Design facilities with optimal amount of wind turbines, PVs, net metering, etc.
  • Analyze equipment power consumption.
Sustainable Agriculture
(Dr. Richardson)

Water

Tillage

Probiotics/Microflora

Photoperiod
## Personnel

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<thead>
<tr>
<th>Faculty Supervisor</th>
<th>Undergraduate Students</th>
<th>Graduate Students</th>
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<tbody>
<tr>
<td>Richardson, C. R.</td>
<td>Contreras, A. J.</td>
<td>Hoitt, C. B.</td>
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<td>Gaffney, C. B.</td>
<td>Cervantes, M. A.</td>
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<td>Garcia, D. S.</td>
<td>Martinez, S. P.</td>
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<td>Gonzalez, Q. R.</td>
<td>Riggs, S. B.</td>
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<td>Gurerra, M. F.</td>
<td>Galvan, H.</td>
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<td>Herrera, A. S.</td>
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<td>Firova, D. J.</td>
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<td>Juarez, M. E.</td>
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<td>Juarez, M. I.</td>
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<td>Manibusan, M. J.</td>
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<td>Molina, E. M.</td>
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<tr>
<td>Total</td>
<td>Total Students Involved</td>
<td>16</td>
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The Agriculture BGREEN Story

Posters & Abstracts

- BGREEN- Farm in a Box “Design”
- Promote sustainability
- Small scale demonstration
- Water availability
- Floating gardens
- Next generation of water sustainability
- Inoculation
- Soil Sifting
Project Focus
and Student Involvement

• Focus: Shape tomorrow’s Hispanic sustainable energy leaders
• Student Involvement
  ▪ Participate in brainstorming and planning meetings
  ▪ Participate in BGREEN plant research trials
  ▪ Participate in data analysis
  ▪ Preparation of posters and abstracts on BGREEN research
  ▪ Preparation of articles for publication
Design and Use of BGREEN Farm in a Box to Produce Vegetables in South Central Texas

Objectives:

• Demonstrate maintaining a vegetable farm in a limited space

• Evaluate benefits of gardening with probiotics and using a raised bed

• Appraise potential of BGREEN Farm in a Box for Hispanic families
Design and Use of BGREEN Farm in a Box to Produce Vegetables in South Central Texas

Results from garden bed with mycorrhizae

Raised garden bed
Inoculation: Medical Break Through or Agricultural Break Through


Objectives:

• Can plants that do not have a relationship with the *Rhizobium* bacteria be inoculated with a strain of the bacteria and sustain nitrogen fixation?

• Would this be an affordable solution to crop improvement?

• Determine if inoculating different fruits and vegetables will provide more efficient edible crops.

• Evaluate supplemental income, and self-satisfaction indicators in financially burdened communities.
Inoculation: Medical Break Through or Agricultural Break Through

Why use mesquite trees?
- Adapted to survive in arid conditions
- It is a phreatophyte
- Roots can grow long to acquire water
The Value of BGREEN Farm in a Box: To Produce and Promote Sustainability in a Hispanic Home

D. S. Garcia, M. A. Cervantes, M. F. Guerra, C. B. Hoitt, and C. R. Richardson

Objectives:

• To identify how you can promote the sustainability of Farm in a Box
• Promote this method to those in Hispanic Homes
• Provide the information needed to promote and make it widely known
The Value of BGREEN Farm in a Box: To Produce and Promote Sustainability in a Hispanic Home

Farm in a Box has been demonstrated and results indicate that this strategy can be valuable in sustaining home vegetable production.
The Texas Stock Tank and its Uses for BGREEN Benefit for People, Livestock and Wildlife

S. B. Riggs, C. B. Hoitt, S. P. Martinez, and C. R. Richardson

Objectives

• Evaluate water availability for animals
• Evaluate water source for sustainable vegetable gardens
• Identify methods and procedures needed to improve long-term water availability
• Disseminate information at the county and state level
The Texas Stock Tank and its Uses for BGREEN Benefit for People, Livestock and Wildlife
Objectives:

• Observe the way the plants benefit and aid each other’s growth
• Harvest corn, beans and squash
• Donate harvested crops to the Hay’s County Food Bank to help the less fortunate and feed the hungry
Small Scale Demonstration and Benefits of Producing Vegetables in BGREEN Boxes
Objectives:

• Recreate the chinapma into a more modern, easy, and affordable way

• Test if this method of agriculture proves to be a competitive alternative to traditional land methods

• Find ways to improve utilization of land space covered by water

• See if floating garden beds can be an alternative way to grow plants that have major pest problems
Floating Garden Beds

Preliminary Results:

• Floating garden beds have reduced the need for irrigation systems and the time one would spend on setting up an irrigation system as well as time spent turning the irrigation system on and off

• Floating gardens may be a way to grow corn and other crops that usually do not do well in this area due to pests

• This new take on ancient growing methods could be a way to revitalize these methods as well as utilize land more efficiently
Objectives

• Determine how effective this device is
• Determine who will benefit from this device
• Determine how difficult the building process is
The Next Generation of Water Sustainability
Soil Sifting Your Garden
D. J. Firova, M. F. Guerra, C. B. Hoitt, and C. R. Richardson

Objectives:

• To remove unwanted material from soil such as rocks, large clay particles, parasitic larvae, and debris

• To create wide rows, deep soil, and raised beds
Soil Sifting Your Garden
Summary

• Total of 16 enthusiastic students were involved
• Internal internships were successfully completed
• Student research involvement was high
• Four undergraduates are now in graduate school
Conclusions

• Students were able to see, feel, and touch concepts and aspects of this BGREEN project
• Undergraduate student education and research exposure was developed
• Graduate student professional development was apparent
Implication

Student involvement in the BGREEN project increased awareness in sustainable agriculture and should be a positive factor in tomorrow’s Hispanic leaders in Texas.
Acknowledgements

Special thanks to the

US Department of Agriculture

for providing the funds to support this program!

Please contact Tongdan Jin at tj17@txstate.edu with your questions.